(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 943 802 A3

(12) EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
23.02.2000 Bulletin 2000/08

(43) Date of publication A2:
22.09.1999 Bulletin 1999/38

(21) Application number: **99104627.7**

(22) Date of filing: **09.03.1999**

(51) Int. Cl.[7]: **F04B 27/18**, F04B 39/02

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **16.03.1998 JP 6573198**

(71) Applicant:
Kabushiki Kaisha Toyoda Jidoshokki Seisakusho
Aichi-ken 448-8671 (JP)

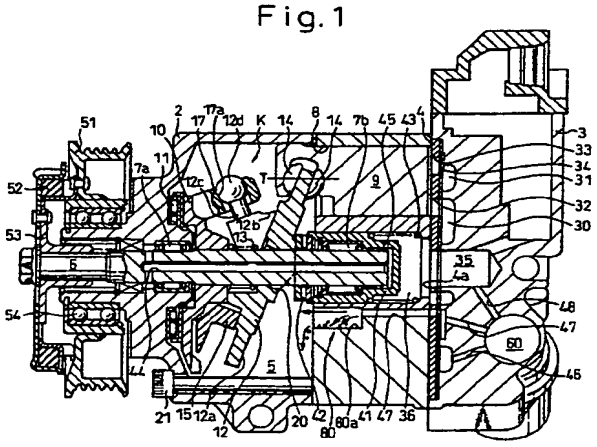
(72) Inventors:
- **Fukanuma, Tetsuhiko,**
  c/o K.K.Toyoda Jidoshokki
  Kariya-shi, Aichi-ken, 448-8671 (JP)
- **Miura, Shintaro,**
  c/o K.K. Toyoda Jidoshokki
  Kariya-shi, Aichi-ken, 448-8671 (JP)
- **Okuno, Takuya,**
  c/o K.K. Toyoda Jidoshokki
  Kariya-shi, Aichi-ken, 448-8671 (JP)
- **Tokunaga, Eiji,**
  c/o K.K. Toyoda Jidoshokki
  Kariya-shi, Aichi-ken, 448-8671 (JP)

(74) Representative:
Hoeger, Stellrecht & Partner
Uhlandstrasse 14 c
70182 Stuttgart (DE)

(54) Variable capacity swash-plate compressor with oil separator

(57) A variable capacity piston-operated refrigerant compressor having a cylinder block provided with cylinder bores in which single-headed pistons are reciprocated to compress a refrigerant gas, and a housing assembly arranged on opposite ends of the cylinder block to define a crank chamber for receiving a cam plate mounted around a rotatably supported drive shaft to cause the reciprocating motion of the pistons in response to the rotation thereof together with the drive shaft, the cam plate further controlling the stroke of the reciprocation of the pistons by the use of a differential pressure between a suction pressure acting on working ends of the respective pistons via a suction chamber and a pressure in the crank chamber communicating with a discharge chamber via a gas supply passage for supplying the discharge pressure refrigerant gas containing therein a lubricating oil which is separated from the refrigerant gas by the oil separating means arranged in the gas supply passage immediately before the refrigerant gas enters the crank chamber. The separated lubricating oil is stored in the crank chamber to lubricate all movable elements in the crank chamber.

Fig. 1



EP 0 943 802 A3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 10 4627

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	DE 197 03 216 A (TOYODA AUTOMATIC LOOM WORKS) 7 August 1997 (1997-08-07) * claim 1; figures 4-6 *	1	F04B27/18 F04B39/02
A	EP 0 628 722 A (TOYODA AUTOMATIC LOOM WORKS) 14 December 1994 (1994-12-14) * column 10, line 5 - line 22 *	1	
A	EP 0 794 331 A (TOYODA AUTOMATIC LOOM WORKS) 10 September 1997 (1997-09-10) * column 7, line 11 - line 57; figures 5,6 *	1	
A	US 5 009 286 A (IKEDA HAYATO ET AL) 23 April 1991 (1991-04-23) * column 3, line 65 - column 4, line 17; figures 3,4 *	1	
A	US 5 088 897 A (ISHIHARA SHINICHI ET AL) 18 February 1992 (1992-02-18) * abstract; figure 7 *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

F04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	23 December 1999	Ingelbrecht, P

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 99 10 4627

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

23-12-1999

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19703216 A	07-08-1997	JP 9209929 A	12-08-1997
		CN 1164617 A	12-11-1997
		FR 2744495 A	08-08-1997
		US 5882180 A	16-03-1999
EP 0628722 A	14-12-1994	JP 6346845 A	20-12-1994
		JP 7019165 A	20-01-1995
		CA 2125233 A	09-12-1994
		DE 69401853 D	10-04-1997
		DE 69401853 T	16-10-1997
		KR 9704811 B	04-04-1997
		US 5797730 A	25-08-1998
EP 0794331 A	10-09-1997	JP 9242667 A	16-09-1997
		CA 2199236 A	06-09-1997
		US 5782316 A	21-07-1998
US 5009286 A	23-04-1991	JP 2153273 A	12-06-1990
US 5088897 A	18-02-1992	JP 2230980 A	13-09-1990
		DE 4006338 A	13-09-1990

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82